

OCEAN GALES AND STORMS, JANUARY, 1933—Continued

Vessel	Voyage		Position at time of lowest barometer		Gale began	Time of lowest barometer	Gale ended	Lowest barometer	Direction of wind when gale began	Direction and force of wind at time of lowest barometer	Direction of wind when gale ended	Direction and highest force of wind	Shifts of wind near time of lowest barometer
	From—	To—	Latitude	Longitude									
NORTH PACIFIC OCEAN													
Tai Yang, Nor. M. S.	Yokohama	San Francisco	36 45 N	153 20 W	Dec. 31	Noon, 31	Jan. 1	29.30	NE	NNE, 11	NW	NNE, 11	NE-N.
Delftdijk, Du. M. S.	Balboa	Los Angeles	14 41 N	95 16 W	do.	1	do.	29.30	WNW	N, 9	NE	N, 9	SSW-SW.
Fernmoor, Nor. M. S.	Vancouver	Shanghai	51 46 N	138 04 W	do.	8 a, 3	Jan. 5	29.28	SW	SSW, 8	W	SW, 10	SSW-SW.
Kiyo Maru, Jap. S. S.	Yokohama	San Pedro	39 06 N	156 40 E	Jan. 1	4 a, 4	do.	29.54	ESE	W, 7	NNE	N, 9	N-NNE.
Golden Peak, Am. S. S.	Otaru	San Francisco	41 33 N	143 35 E	Jan. 2	4 p, 2	Jan. 4	29.91	N	N, 8	NNE	N, 9	N-NNE.
Salawati, Du. M. S.	Manila	do.	42 45 N	154 06 E	do.	Noon, 3	do.	29.54	SE	NE, 8	N	NE, 9	SE-NE.
Emp. of Russia, Br. S. S.	Vancouver	Yokohama	51 41 N	169 38 W	do.	4 p, 5	Jan. 6	28.80	SW	NE, 9	NE	NE, 10	E-NE-NNE.
Varanger, Du. M. S.	Yokohama	San Francisco	35 59 N	159 49 E	Jan. 4	6 a, 4	Jan. 4	29.72	WNW	WNW, 8	NW	NW, 9	WNW-NW.
Tai Yang, Nor. M. S.	do.	do.	44 10 N	168 11 W	Jan. 5	6 a, 6	Jan. 6	29.18	W	WSW, 9	SW	WSW, 10	Steady.
Tatsuno Maru, Jap. S. S.	do.	do.	39 25 N	162 40 E	Jan. 7	2 a, 8	Jan. 8	29.17	ESE	ENE, 10	N	ENE, 10	E-ENE-NE.
Fernhill, Nor. M. S.	Manila	San Pedro	38 08 N	162 15 W	Jan. 8	4 a, 9	Jan. 9	29.61	SSE	SSE, 9	SSW	SSE, 10	SSE-S-SW.
Varanger, Du. M. S.	Yokohama	San Francisco	36 45 N	176 50 W	do.	6 p, 8	do.	29.06	SW	SW, 10	W	WSW, 10	SW-WSW-W.
Kiyo Maru, Jap. S. S.	do.	San Pedro	40 10 N	175 21 E	do.	6 p, 8	Jan. 10	29.00	ESE	NE, 10	NNW	NE, 10	E-NE-NNE.
Pres. Taft, Am. S. S.	Victoria	Yokohama	50 31 N	132 46 W	do.	8 p, 8	Jan. 11	29.21	SE	SSW, 9	W	SW, 10	SW-SSW-W.
Fernmoor, Nor. M. S.	Vancouver	Shanghai	52 00 N	171 35 W	Jan. 9	1 p, 9	Jan. 10	29.51	NE	NNE	NNW	NNE, 10	Steady.
Salawati, Du. M. S.	Manila	San Francisco	41 55 N	179 50 W	Jan. 8	2 p, 8	Jan. 12	29.00	E	NE, 10	W	NE, 10	NE-N.
Kedoe, Du. M. S.	Ternate	Los Angeles	*28 00 N	*170 00 E	Jan. 10	2 a, 12	Jan. 13	29.66	NW	NW, 12	NE	NW, 12	NE-NNE.
Nairnbank, Br. M. S.	San Pedro	Yokohama	29 07 N	178 09 E	Jan. 12	6 p, 12	do.	29.90	N	NE, 8	NE	NNE, 9	NE-NNE.
Pres. Taft, Am. S. S.	Victoria	do.	51 00 N	177 00 W	do.	2 p, 14	Jan. 14	29.62	WSW	S, 9	WSW	S, 10	SW-SSE.
Golden Tide, Am. S. S.	Hong Kong	San Francisco	46 58 N	175 00 E	Jan. 13	7 a, 14	do.	29.26	E	SW, 8	SW	SW, 9	Steady.
Maul, Am. S. S.	Honolulu	do.	35 10 N	131 00 W	Jan. 15	4 a, 16	Jan. 16	29.94	NNW	N, —	NNW	N, 8	NNW-N.
Kuraha Maru, Jap. M. S.	Los Angeles	Yokohama	46 50 N	175 08 W	Jan. 16	do.	do.	do.	do.	do.	do.	W, 11	W, 11
Fernbank, Nor. M. S.	Cebu	San Pedro	35 12 N	177 41 E	do.	2 p, 16	Jan. 17	29.65	S	S, 8	NNW	SSE, 9	SSE-NNW.
Ogura Maru, Jap. M. S.	Yokohama	do.	35 30 N	145 15 E	Jan. 17	4 a, 18	Jan. 18	29.63	S	SW, 10	NW	SW, 10	S-SW-W.
Fernmoor, Nor. M. S.	Vancouver	Shanghai	44 38 N	148 55 E	do.	3 p, 18	Jan. 19	28.80	SSE	Var.	WNW	E, 11	E-SW.
Mericos H. Whittier, Am. S. S.	Honolulu	San Francisco	34 50 N	131 35 W	Jan. 18	6 a, 19	Jan. 20	29.74	NW	NW, 9	NW	NW, 9	NW-N.
Pres. Madison, Am. S. S.	Yokohama	Victoria	47 22 N	170 21 E	Jan. 19	1 p, 19	do.	29.80	SSE	S, 8	SW	S, 9	SSE-S.
Stanley Dollar, Am. S. S.	Philippines	Los Angeles	34 20 N	154 39 E	Jan. 20	6 a, 20	do.	29.98	N	N, 9	NNE	N, 9	SW-N-NNE.
Everett, Am. S. S.	Tacoma	Long, 150° W	*51 48 N	*146 42 W	Jan. 22	4 a, 23	Jan. 24	29.06	WSW	WNW, 7	W	WNW, 11	WNW.
Do.	Long, 150° W	Tacoma	*50 38 N	*148 00 W	Jan. 25	4 p, 25	Jan. 28	29.11	WSW	W, 11	NW	W, 11	W, 11
Admiral Peoples, Am. S. S.	Portland	San Pedro	45 38 N	124 16 W	Jan. 22	4 p, 22	Jan. 26	29.41	SSW	SSE, 7	SW	SSE, 9	Steady.
Wisconsin, Am. S. S.	Japan	San Francisco	47 00 N	153 35 W	Jan. 25	8 a, 25	do.	29.86	W	W, 7	NW	NW, 10	W-NW.
San Pedro Maru, Jap. M. S.	Yokohama	do.	36 48 N	154 58 E	Jan. 24	6 a, 28	Jan. 28	29.17	NE	W, 4	NNE	NNW, 11	WSW-W.
Tacoma, Am. S. S.	Taku Bar	Seattle	50 00 N	163 30 W	Jan. 30	3 a, 31	Jan. 31	29.00	E	E, 7	SE	—, 10	Calm-E.
SOUTH PACIFIC OCEAN													
Maunganui, Br. S. S.	Rarotonga	Wellington	22 17 S	160 52 W	Jan. 3	12.30 a, 4	Jan. 4	28.62	N	NW, 11	S	SSW, 12	N-NW-SW.
Niagara, Br. S. S.	Sydney	Honolulu	27 30 S	176 34 E	Jan. 11	Noon, 11	Jan. 12	28.86	ESE	NW, 9	W	NW, 12	N-NW-W.

* Position approximate.

NORTH PACIFIC OCEAN, JANUARY, 1933

By WILLIS E. HURD

Atmospheric pressure.—The average center of the Aleutian cyclone shifted somewhat farther eastward than usual during January, 1933. It lay over the Gulf of Alaska, with pressure lower at Juneau, 29.57 inches, than at Kodiak, 29.60 inches, which is very unusual, as the normal pressure at Juneau is .30 inch higher than that at

TABLE 1.—Averages, departures, and extremes of atmospheric pressure at sea level, North Pacific Ocean, January, 1933, at selected stations

Stations	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Inches	Inch	Inches		Inches	
Point Barrow	29.93	-0.15	30.38	1	29.40	21
Dutch Harbor	29.71	+ .13	30.28	21	28.96	6
St. Paul	29.72	+ .09	30.18	17	28.66	24
Kodiak	29.60	+ .01	30.50	14	29.02	25
Juneau	29.57	- .32	30.61	15	28.93	23
Tatoosh Island	29.80	- .18	30.63	11	29.09	24
San Francisco	30.05	- .06	30.39	12	29.54	19
Mazatlan	29.94	- .08	30.00	2, 11	29.86	29
Honolulu	30.03	+ .03	30.20	26	29.82	31
Midway Island	29.98	- .05	30.24	18	29.72	11
Guam	29.90	- .00	29.98	6, 11, 16	29.80	25
Manila	29.92	- .06	30.02	2, 3	29.82	19, 20, 21, 22
Naha	30.19	+ .11	30.38	13, 14	29.96	20
Chichishima	30.09	+ .08	30.30	9	29.88	23
Nemuro	30.02	-----	30.40	5	29.34	17

NOTE.—Data based on 1 daily observation only, except those for Juneau, Tatoosh Island, San Francisco, and Honolulu, which are based on 2 observations. Departures are computed from best available normals related to time of observation.

Kodiak. Over the Aleutian Islands pressures were higher than normal, but along most of the American coast east of longitude 150° W., they were below the average for the month.

The eastern Pacific anticyclone remained for most of the month between California and the Hawaiian Islands. High pressure lay off the central Asiatic coast, with average barometric readings about a tenth of an inch above normal over the North China Sea and as far eastward as the Ogasawara Islands.

Cyclones and gales.—Gales of force 8 or higher were reported as encountered in some part of the North Pacific Ocean on every day of the month except the 29th, and on 7 or 8 days forces of 11 or 12 were experienced in localities. The greater part of these gales occurred north of the thirtieth parallel. Such continental cyclones as entered the sea area from Asia were apparently weak depressions at the outset, and acquired energy only as they crossed the warm current of the Kuroshio. Hence the gales were mainly associated with cyclones of oceanic origin or development. An example of this is the cyclone of January 16-22 which showed little development until the 18th, east of Yezo and the Kuril Islands, when it suddenly attained great depth and swept the whole western end of the northern steamship routes with fierce gales, diminishing on the 19th, as the storm moved across Bering Sea on its way to the Arctic Ocean.

The middle-latitude storm of the 5th to 11th originated at sea southeast of Japan. During the first six days it

moved across the ocean on a general northeasterly course to the Gulf of Alaska. On the 7th it caused whole gales locally near 40° N., 163° E., and on the 8th and 9th was the source of strong to whole gales over a wide extent in midocean. On the 10th the gale area was over the northeastern waters.

About the 10th the lower extension of a central Aleutian cyclone became detached from the principal storm center. It developed energy on the two following days in low latitudes, resulting in strong northeast gales near Midway Island on the 12th, and northwest winds of hurricane strength, encountered by the Dutch motorship *Kedoe*, to the west of Midway on the 11th and 12th. Thereafter it quickly dissipated.

The stormiest period of the month was the 23d to 26th, when the winds were strongest, within the approximate 10-degree square, 45° – 55° N., 140° – 150° W., where gales of force 10 to 11 were encountered during the 4 days. The storm abated on the 27th.

On the northern portion of the American coast the principal high winds of the month were a whole gale on the 1st near Vancouver Island, and fresh to strong gales on the 18th and the 22d to 26th off the Washington and Oregon coasts.

The accompanying storm table lists all the important gales of the month that space accommodates, but omits some of the numerous gales of force 8 which have been reported.

Monsoons and northers.—Owing to the highly developed state of the Asiatic anticyclones and their projection oceanward, the northeast monsoon was an important meteorological condition during more than half of January over the Japan, Yellow, and North China Seas.

In the Gulf of Tehuantepec less than the normal number of January days with northers occurred. Some Tehuantepecer weather was reported, but the only gales of record in the gulf were one of force 9 on the 1st, and another of force 7 on the 5th.

Fog.—Fog increased somewhat in occurrence, both on the United States coast and in midocean, over that of December, 1932. It occurred on 6 days off the California coast; in midocean mostly from the 24th to 29th; and on a few scattered dates in other parts of the sea.

TROPICAL CYCLONE IN THE SOUTH PACIFIC OCEAN, JANUARY 3–4, 1933

A special report from the R. M. S. *Maunganui*, Cook Islands to Wellington, New Zealand, states that the ship was caught in a cyclone of hurricane intensity in latitude $22^{\circ} 17'$ S., longitude $160^{\circ} 52'$ W., or approximately 80 miles southwest of Rarotonga Island, on the night of January 3–4, 1933.

The vessel left Rarotonga at 5:20 p. m. of the 3d, with heavy rain, backing wind, and falling pressure. At 11 p. m. the wind was north-northeast, force 8, with seas making rapidly. At 11:55 p. m. the wind was from the northwest, force 12, and the ship hove to. At 12:30 a. m. of the 4th the corrected barometer read 969 mb. (28.62 inches). Shortly thereafter the wind moderated to west-southwest, 7, with rising barometer and clear sky overhead. It was followed by renewed hurricane velocities until 2 a. m., after which wind and sea began slowly to abate. Several hands on board received injuries during the storm, and much minor damage was sustained by the ship.—W. E. Hurd.

CLIMATOLOGICAL TABLES

DESCRIPTION OF TABLES AND CHARTS

Table 1 gives the data ordinarily needed for climatological studies for about 188 Weather Bureau stations making simultaneous observations at 8 a. m. and 8 p. m. daily, seventy-fifth meridian time, and for about 25 others making only one observation. The altitudes of the instruments above ground are also given.

Beginning with January 1, 1932, all wind movements and velocities published herein are corrected to true values by applying to the anemometer readings corrections determined by actual tests in wind tunnels and elsewhere.

Table 2 gives, for about 36 stations of the Canadian Meteorological Service, the means of pressure and temperature, total precipitation, depth of snowfall, and the respective departures from normal values except in the case of snowfall. The sea-level pressures have been computed according to the method described by Prof. F. H. Bigelow in the REVIEW of January, 1902, 30: 13–16.

CHART I.—*Temperature departures.*—This chart presents the departures of the monthly mean surface temperatures from the monthly normals. The shaded portions of the chart indicate areas of positive departures and unshaded portions indicate areas of negative departures. Generalized lines connect places having approximately equal departures of like sign. This chart of monthly surface temperature departures in the United States was first published in the MONTHLY WEATHER REVIEW for July, 1909, but smaller charts appear in W. B. Bulletin U for 1873 to June, 1909, inclusive.

CHART II.—*Tracks of centers of ANTICYCLONES;* and

CHART III.—*Tracks of centers of CYCLONES.* The Roman numerals show the chronological order of the

centers. The figures within the circles show the days of the month, the location indicated being that at 8 a. m., seventy-fifth meridian time. Within each circle is also an entry of the last three figures of (Chart II) the highest barometric reading, or (Chart III) the lowest reading reported at or near the center at that time, in both cases as reduced to sea level and standard gravity. The intermediate 8 p. m. locations are indicated by dots. The inset map of Chart II shows the departure of monthly mean pressure from normal and the inset of Chart III shows the change in mean pressure from the preceding month.

The use of a new base map for Charts II and III began with the January, 1930, issue.

CHART IV.—*Percentage of clear sky between sunrise and sunset.*—The average cloudiness at each regular Weather Bureau station is determined by numerous personal observations between sunrise and sunset. The difference between the observed cloudiness and 100 is assumed to represent the percentage of clear sky, and the values thus obtained are the basis of this chart. The chart does not relate to the night hours.

CHART V.—*Total precipitation.*—The scales of shading with appropriate lines show the distribution of the monthly precipitation according to reports from both regular and cooperative observers. The inset on this chart shows the departure of the monthly totals from the corresponding normals, as indicated by the reports from the regular stations.

CHART VI.—*Isobars at sea level, average surface temperatures, and prevailing wind directions.*—The pressures have been reduced to sea level and standard gravity by the method described by Prof. Frank H. Bigelow in the